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Comparing Vermont and Washington Erodible River Corridor Policies

Abstract

Across the United States and worldwide, flooding is the costliest natural disaster and, contrary to public perception, in some places, fluvial erosion accounts for a greater share of those impacts than inundation. The lack of U.S. federal regulation of erosion hazards has driven states to take the lead; Washington State and Vermont were the first two states to introduce erosion hazard management policies, and those policies have served as templates for neighboring states. Washington and Vermont erosion hazard management policies follow the same guiding principle of embracing a river's natural tendency to erode, deposit, and migrate across the floodplain rather than restricting it to a single channel. Furthermore, both Washington's channel migration zone (CMZ) program and Vermont's river corridor program aim to reduce erosion risk, enhance water quality, and improve ecological conditions by delineating an erodible river corridor that includes the current active channel and buffers on either side in which counties or municipalities are encouraged to enact strict land use regulations. Despite similar goals, the varying assessment strategies and incentives, along with differences in the states' recent experiences with fluvial erosion, have led to different implementation outcomes. Moving forward, I recommend that: 1) river corridor regulation be mandatory, not discretionary; 2) state agencies, as opposed to counties and municipalities, delineate river corridors; and 3) river corridor planners increase public buy-in by prioritizing education on erosion hazards and river corridor policies that is accessible to laypeople.

Problem Statement

Flooding is the costliest and most frequent disaster in the United States, accounting for approximately 90% of the country's natural disasters and $8 billion in annual damages (FEMA, 2010). In Vermont, greater than 75% of the state's flood damages (in dollars) are the result of erosion damages from flooding events, rather than inundation damages (2018 Vermont State Hazard Mitigation Plan). While fluvial inundation hazards have been the subject of extensive U.S. federal regulation since as early as the 1960s, fluvial erosion hazards lack coherent federal regulation (Janes, 2012). This lack of regulation is likely due to the increased complexity of calculating erosion risk versus inundation risk and the more gradual nature of erosion (though it is greatly accelerated during extreme flood events). Regardless of the causes underlying the lack of federal regulation, the severity of the erosion hazard – alongside the increasing awareness of the ecological and water quality benefits of preserving and restoring rivers to their natural dynamically erosive states – has driven states to take the lead in erosion management regulation.

Washington State and Vermont are the first two states to enact policies that address riverine erosion and their policies have served as templates for other states to enact similar policies (Janes, 2012). Although there is a strong culture of interstate collaboration in developing erosion regulations, that collaboration has, to date, been geographically limited; Vermont has shared expertise with its neighbors, New Hampshire and Massachusetts, while Washington has shared with Oregon and Montana. This geographic isolation makes sense given that topographical, climate, and soil conditions are more comparable among neighboring states, but there are still many opportunities to increase knowledge-sharing nationwide.

In this study, I compared and assessed Washington's channel migration zone (CMZ) program and Vermont's river corridor program to formulate recommendations to strengthen the

two programs. My comparative analysis can contribute to developing a hybrid template for other states to develop their own erosion hazard management programs building on the successful elements of Washington's and Vermont's policies.

Methods

I conducted a document review focused on the official documents provided on the Washington CMZ program and Vermont river corridor program websites. I also reviewed the analyses of these documents by neighboring states, especially Massachusetts, intended to guide the development of those states' own erodible corridor regulations. Additionally, I reviewed the state laws that brought those programs into effect, including Washington's Shoreline Management Act and Growth Management Act and Vermont Statutes Chapter 49: River Corridor Protection.

I interviewed authors of the regulatory documents I reviewed, including the former coordinator of the Vermont river corridor program, Mike Kline, and Washington Department of Ecology officials Patricia Olson and Tim Abbe; unfortunately, only Tim Abbe was able to interview in time for inclusion in this report. Additionally, Roy Schiff, a consultant at the Vermont office of the environmental engineering consulting firm Milone & MacBroom Inc., was able to answer questions relating to the Vermont program.

Results & Discussion

I was not able to determine the exact current levels of adoption of Washington's CMZ regulations (enacted at the county level) or of Vermont's river corridor regulations (enacted at the municipal and, to a lesser extent, regional level). However, an undated presentation by

former Vermont river corridor program manager Mike Kline to Massachusetts colleagues reported that, as of at least as recently as 2012, 170 (out of 251) Vermont municipalities had draft river corridor plans, the State of Vermont had developed 84 draft river corridor maps, and 40 municipalities had adopted river corridor and floodplain maps as bylaws or ordinances (Kline, Undated). Figure 1 shows the delineated river corridors in Vermont as of January 2015 (the Vermont Department of Environmental Conservation published an updated dataset in August 2019 but that dataset contained errors that prevented it from being opened in ESRI's ArcMap) and Figure 2 shows a detail of the river corridors in the state capital, Montpelier.

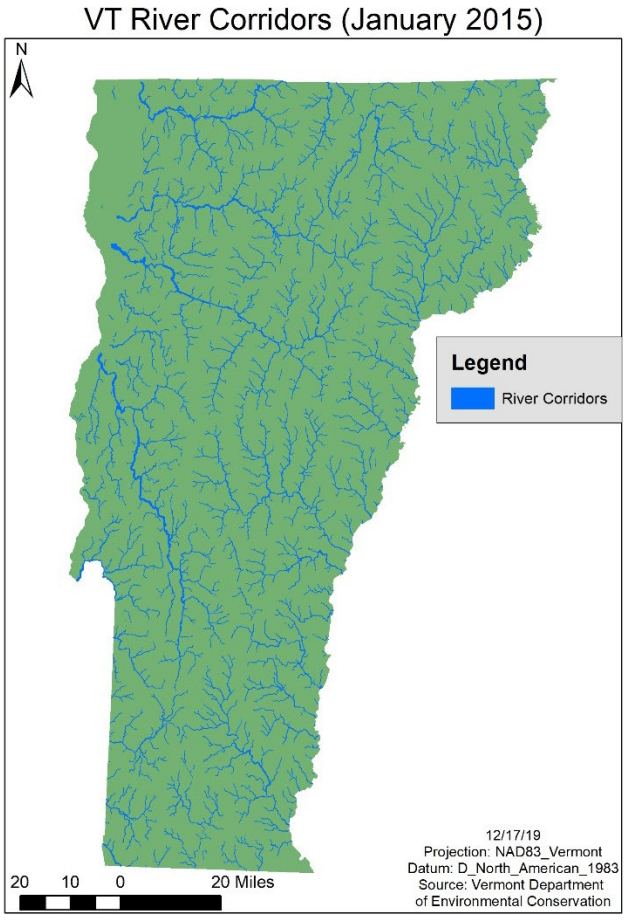

Fig. 1: River Corridors in Vermont as of January 2015

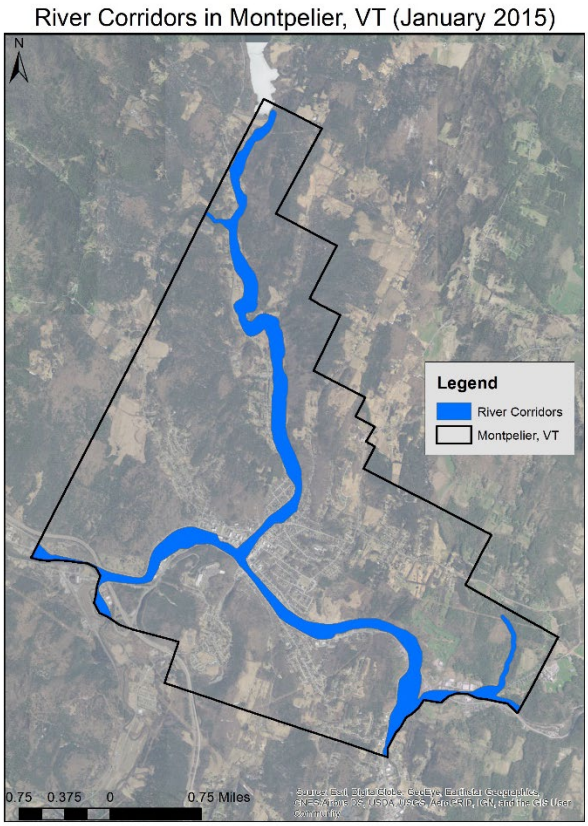

Fig. 2: River Corridors in Montpelier, Vermont as of January 2015

Washington's and Vermont's erodible corridor regulations are overall similar, and both have experienced at least partial adoption by their sub-jurisdictions, but the two states' implementation structures have key differences. Washington mandates that all counties delineate CMZs within their boundaries, while the state provides delineation methods and certain land use restrictions that county regulations of "shoreline" areas must achieve (though it is at the counties' discretion whether those shoreline regulations also apply to CMZs they delineate). Vermont, on the other hand, delineates all its river corridors at the state agency level and does not require river corridor policy adoption – which takes place at the municipal and occasionally regional levels – but instead encourages adoption through financial incentives (State of Vermont, Undated).

Washington's and Vermont's differing methods of delineating erodible corridors and incentivizing sub-jurisdictions to implement erodible corridors policies provide insights into how to hone those states' existing policies and develop similar policies in other states.

2003 alterations to the Washington Shoreline Management Act and Growth Development Act mandated that all counties delineate CMZs and encouraged counties to include those CMZs in the areas subject to their Shoreline Master Program land use policies (Janes, 2012). By 2003, King County had already implemented CMZs for three river reaches (Snoqualmie River, Green River, and Tolt and Raging rivers), however other counties that had not voluntarily adopted the regulations have subsequently encountered severe impediments, primarily stemming from neighboring property owner pushback. The first county to enact the regulations – and the one that served as a model for the statewide program – was King County, which includes Seattle and the surrounding metropolitan area and is the wealthiest, most populous county in the state. Other Washington counties, such as the more rural and lower-income Lewis County, have faced strong resistance to CMZ delineations from property owners with lands adjacent to or included within the projected CMZs. Kelly Janes (2012) speculated that this resistance comes from suspicion that the regulations are a guise for the government to devalue private land then purchase it at discount rates, belief that existing inundation risk management policies are already sufficient (or excessive), and a general distrust of government. As of 2013, various counties' CMZ delineations were gridlocked due to refusal of locals to adopt proposed CMZ maps and regulations. Although opposition from residents is hardly the optimal outcome, if managed correctly, it may be an opportunity to educate those residents about the hazards their properties face. According to Tim Abbe (one of the two authors of the original 2003 CMZ delineation method), some of the most stringent CMZ delineations in Washington are in politically "purple"

counties with vocal minorities who originally opposed adoption of CMZ delineations (pers. comm. 2019). Although wealthier, left-leaning counties spearheaded Washington's CMZ program and poorer, right-leaning counties tended to be more resistant, successful CMZ implementation has ultimately proven more bipartisan than initial results implied.

In Vermont, municipalities and occasionally regional planning commissions are responsible for adopting river corridor policies, but the first important difference from Washington's CMZ regulations is that adoption in Vermont is voluntary. The state provides financial incentives for municipalities to adopt river corridor regulations, primarily by giving municipalities that have adopted the regulations priority in river- and infrastructure-related state funding allocations.

A second critical difference between Washington's and Vermont's programs is who carries the responsibility for delineating the erodible corridor areas. Washington requires that counties perform (or contract out) CMZ assessments within their boundaries and provides extensive technical guidance documentation to inform those assessments. The burden on counties to perform the assessments has proved a major obstacle to many counties' implementation of CMZ regulations, since county staff typically lack the expertise to perform those assessments and county budgets lack funding to hire consultants (Janes, 2012). Presumably in response to criticism of the complexity of these methods, in 2014 the Washington Department of Ecology released a simplified version of its suggested CMZ delineation methods, the Planning Channel Migration Zone (pCMZ) standards (as opposed to the Detailed Channel Migration or dCMZ standards). These pCMZ standards, in addition to being more digestible to lay audiences, may also be more useful for larger scales, while dCMZ standards may still be more appropriate for smaller reaches (Washington State Department of Ecology, 2014). I did not find clear

documentation of whether these simplified standards have eased a barrier to implementation by reducing counties' difficulty in delineating CMZs.

In contrast, Vermont does not mandate that municipalities or counties perform their own river corridor delineation assessments; instead, the state Agency of Natural Resources delineated the river corridors across all of Vermont (State of Vermont, Undated). This likely required a large up-front financial and manhour investment but may ultimately achieve broader assessment at a lower per-river-mile rate than in Washington, where many smaller jurisdictions that do not have qualified experts in their staff are required to hire expensive consultants to do the work on individual reaches. Having qualified experts at a stage agency delineate river corridors may also provide the benefit of more consistent delineations across county or municipal boundaries, which will make project success easier to assess. It is possible that statewide river corridor delineation is feasible in a small state like Vermont but not in larger Western states; however, the Vermont example can still be of use to similarly sized neighbors like Massachusetts and New Hampshire.

The final major difference between Washington's and Vermont's erodible corridor programs is how accessible their delineation methods are to laypeople, such as landowners within the corridors. In Washington especially, resistance from neighboring landowners has emerged as a major impediment to adopting erodible corridor regulations (Janes, 2012). This may be due in large part to a lack of understanding of how the CMZs were delineated to include their property. (As mentioned previously, in 2014, the Washington Department of Ecology released a second, simplified set of river corridor delineation methods that allowed for delineation of a Planning Channel Migration Zone (pCMZ), while more-detailed prior guidance delineated a Detailed Channel Migration Zone (dCMZ).) Higher rates of documented resistance from neighbors in Washington as compared to Vermont may also stem from the recent memory

of extreme erosion during 2011's Tropical Storm Irene in Vermont and the fact that river corridor policy adoption in Vermont is voluntary while it is mandatory in Washington. Possibly because the State of Vermont performed river corridor delineations at the state level (and therefore may have used more rigorous methods than what it presented to the public), the methods that Vermont used were more easily understandable to laypeople, which may have preempted some resistance from neighbors.

Although the above differences have likely led to some disparate obstacles, the majority of the challenges that the two states have faced are common to both – and likely to other states that try to implement similar policies in the coming years. The biggest common obstacle is a lack of clarity for laypeople regarding how flood-driven erosion and flood-driven inundation (and their associated regulations) interact. From a risk comprehension standpoint, neighbors may fail to recognize the urgency of regulating to reduce erosion risk. Laypeople frequently assume that if their structures are above the "base flood elevation" (the level expected for a specified flood, usually the 100-year flood) that they are safe from erosion as well as inundation (Janes, 2012). The reality, however, is that structures on elevated landforms within the fluvial erosion hazard zone can still suffer damage due to compromised foundations, even if the waters never enter their structures.

Similarly, there are frequent misunderstandings regarding the interplay between erosion risk reduction policies and inundation risk reduction policies (Janes, 2012). Although the two types of regulation operate similarly both in Washington and Vermont – by restricting new developments and substantial improvements to existing structures that were grandfathered in – many planners assume that having inundation risk reduction policies in place is sufficient to reduce erosion risk as well. This is often false for the following reasons: inundation policies do

not address the water quality and ecological benefits of allowing erosion to restore natural sediment regimes, and erosion hazard zones often extend past the boundaries of inundation hazard zones due to either natural conditions or human-driven streambed incision that reduces inundation risk while increasing erosion risk. Educating the public in an easily accessible manner could be a key to increasing stakeholder buy-in for both Washington and Vermont.

Conclusion

Washington's Channel Migration Zone program and Vermont's River Corridor program are overall very similar. These programs are pioneers in U.S. erodible corridor regulation and provide excellent examples for other states to emulate in developing their own erodible corridor regulations. That said, the three key differences between the Washington and Vermont programs can offer insight for how to improve upon those programs, both within Washington and Vermont and in other states.

Based on analysis of the three critical differences between Washington's and Vermont's erodible corridor programs (mandatory vs. voluntary adoption of land use regulations in river corridors, state vs. smaller jurisdictions delineate river corridors, and accessibility of program documents to laypeople), I recommend that future erodible corridor programs have the following attributes:

1) Mandatory adoption of river corridor land use regulations (with state funding and technical guidance to assist in adoption),
2) State delineates river corridors, and
3) River corridor delineation methods – or at least a simplified, bigger-picture version of them – more accessible to laypeople.

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